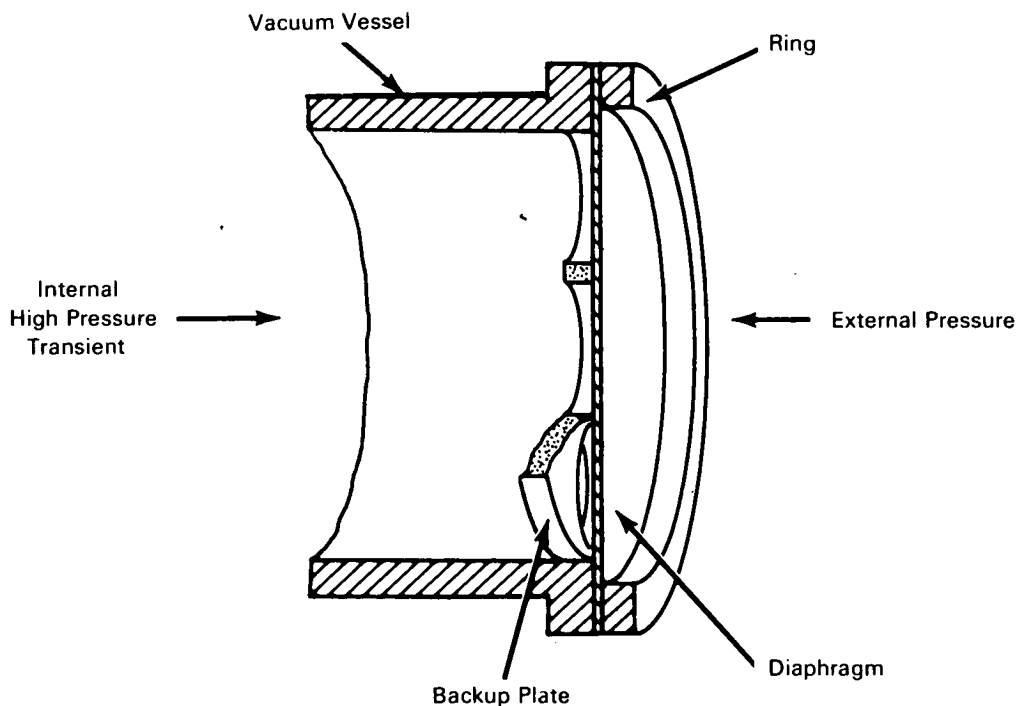


NASA TECH BRIEF



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Burst Diaphragm Protects Vacuum Vessel From Internal Pressure Transients



The problem: To protect vacuum vessels from transient internal pressures. The protection device must provide a positive pressure seal during normal operation of the vacuum vessel.

The solution: A supported dual-mode burst diaphragm that forms the interface between the vacuum in the vessel and an external pressure. The diaphragm will withstand a larger differential pressure in one direction than in the opposite.

How it's done: The diaphragm consists of a circular sheet of material stretched over a large-diameter ring. The side of the diaphragm facing the vacuum vessel is supported by a backup plate containing several holes of a diameter appreciably smaller than the inside diameter of the large ring.

If a sufficiently high pressure transient arises in the vacuum vessel, the diaphragm will bulge outward and be supported only at the periphery of the large-diameter ring. An external pressure will cause the diaphragm to bulge inward through the small-diameter

(continued overleaf)

holes in the backup plate. The bursting pressure in this direction is greater because the backup plate supports the diaphragm over a greater area. The ratio of the bursting pressures is approximately inversely proportional to the ratio of the diameter of the holes in the backup support and the diameter of the large ring.

Notes:

1. This diaphragm arrangement is gastight and responsive to high-frequency transient pressure shocks. The diaphragm can be used in any application in which it is desirable to have different maximum net pressures in opposite directions.

2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California, 91103
Reference: B65-10236

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: George M. Hotz and
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